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ANNUAL REPORT

TALC AND PYROPHYLLITE

By Robert L. Virta

1990

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

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TALC AND PYROPHYLLITE

U.S.
DEPARTMENT
OF THE
INTERIOR

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Secretary

BUREAU
OF
MINES

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Director

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COVER PHOTO:
Talc is used as a filler and extender in paints and plastics, for pitch control in paper, as a component in ceramics, and as a sculpting media.

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TALC AND PYROPHYLLITE

By Robert L. Virta

Mr. Virta, a physical scientist with 15 years of U.S. Bureau of Mines experience, has been the commodity specialist for talc and pyrophyllite since 1986. Domestic survey data were prepared by Linder Roberts, mineral data assistant; and international data tables were prepared by William Zajac, Chief, Section, International Data.

Domestic production of talc and pyrophyllite increased slightly from that of 1989 to 1,267,167 metric tons. Sales of crude and processed talc decreased 4% to 1,021,004 tons in tonnage and decreased 3% in value. Sales of pyrophyllite increased slightly. Imports for consumption decreased 17% in tonnage to 65,099 tons and decreased 9% in value to $11,056,000. Exports decreased 25% in tonnage to 238,000 tons and increased 14% in value to $32,909,000. During the past 10 years, talc and pyrophyllite production averaged 1,075,000 tons; sales, 972,000 tons; domestic consumption, 948,000 tons; exports, 242,000 tons; and imports, 49,000 tons. The major use for talc was in ceramics, which accounted for 28% of the domestic consumption, followed by paint, 18%; paper, 17%; roofing, 11%; plastics, 6%; and other, 20%. The major use for pyrophyllite was in ceramics, followed by refractories, insecticides, paint, plastics, and rubber.

DOMESTIC DATA COVERAGE

Domestic production and sales data for talc and pyrophyllite are developed by the U.S. Bureau of Mines from a voluntary survey of U.S. mines and mills. Survey forms were sent to 18 companies that operated 52 mines and mills. Seventeen companies that account for approximately 99% of the domestic production responded to the survey. Production data for the nonrespondent were estimated from reported prior-year production levels adjusted by trends in employment and other guidelines.

ANNUAL REVIEW

Legislation and Government Programs

The Occupational Safety and Health Administration (OSHA) extended an administrative stay on its 1986 regulation governing worker exposure to the nonasbestiform varieties of actinolite, anthophyllite, and tremolite through August 31, 1991. During the stay, OSHA continued to analyze the impact of using the asbestos standard to regulate the nonasbestiform varieties of the minerals. An exposure limit of two fibers per cubic centimeter will remain in effect during the stay.[1]

The Mine Safety and Health Administration (MSHA) continued to review its proposed revisions to its air quality, chemical substances, and respiratory pro-

TABLE 1

SALIENT TALC AND PYROPHYLLITE STATISTICS

(Thousand metric tons and thousand dollars)

	1986	1987	1988	1989	1990
United States:					
Mine production, crude:					
Talc	1,106	1,080	1,136	1,172	1,185
Pyrophyllite	75	83	97	81	82
Total[1]	1,181	1,163	1,234	1,253	1,267
Value:					
Talc	$29,687	$27,265	$29,364	$27,731	$31,068
Pyrophyllite	$1,540	$1,607	$1,820	W	W
Total	$31,227	$28,872	$31,185	[2]$27,731	[2]$31,068
Sold by producers, crude and processed:					
Talc	971	975	940	1,065	1,021
Pyrophyllite	75	82	93	79	80
Total[1]	1,046	1,057	1,033	1,145	1,101
Value:					
Talc	$111,924	$113,394	r$115,899	$114,453	$110,585
Pyrophyllite	$3,366	$3,712	$4,164	W	W
Total[1]	$115,290	$117,107	$120,063	[2]$114,453	[2]$110,585
Exports[3] (talc)	212	255	260	319	238
Value	$16,302	$19,607	$21,391	$28,949	$32,909
Imports for consumption (talc)	47	48	79	78	65
Value	$8,715	$10,348	$12,268	$12,128	$11,056
Apparent consumption[4]	1,016	956	1,054	1,012	1,054
World: Production	r7,755	r7,799	r7,956	r8,271	e8,251

e Estimated. r Revised. W Withheld to avoid disclosing company proprietary data.

[1] Data may not add to totals shown because of independent rounding.

[2] Does not include value for pyrophyllite.

[3] Excludes powders—talcum (in package), face, and compact.

[4] Production, plus imports, minus exports, plus adjustments in Government and industry stock. Does not include imported pyrophyllite.

tection standards. The proposed permissible 8-hour time weighted average exposure limit is 2.5 milligrams per cubic meter for talc (containing no asbestos), 3 milligrams per cubic meter for respirable soapstone, and 6 milligrams per cubic meter for total soapstone dust. The nonasbestiform varieties of tremolite, anthophyllite, and actinolite would be covered under the proposed respirable mine dust standard.[2]

MSHA issued a proposed rule that would create a hazard communication standard. Mine operators would be required to provide information to their employees concerning any hazards that chemicals, including talc, produced or used on the premises through labeling, material safety data sheets, and employee training.[3]

Issues

The health risk posed by nonasbestiform varieties of tremolite, anthophyllite, and actinolite continued to be a concern for a portion of the talc industry. OSHA is evaluating whether to regulate the nonasbestiform amphiboles as asbestos, regulate nonasbestiform amphiboles under a separate standard, or not to regulate nonasbestiform amphiboles.

Production

Talc.—Thirteen companies operating 22 mines in 10 States produced talc, soapstone, and steatite. These companies generally were structured to cover all aspects of talc mining, from mining to processing. Only a few companies hired custom grinders to mill the ore. The largest of the domestic producers were Cyprus Industrial Minerals Co. Inc., Dal Minerals, Gouverneur Talc Co., Montana Talc Co., and Pfizer Inc. The major producing deposits were in Montana, New York, Texas, and Vermont.

Commercial talc production was from deposits that were formed through hydrothermal alteration of ultrabasic rocks and low-grade metamorphism of siliceous dolomites. They generally occur as lenses or pods in the country rock. Magnesite, quartz, chlorite, magnetite, serpentine, anthophyllite, tremolite, dolomite, and actinolite may be present as accessory minerals.

Most of the domestic talc production was from open pit mining operations. Underground mining was used only when a large waste rock to ore ratio made open pit mining uneconomical. Typically, overburden was removed, and blasting was used to fracture the ore. The companies then used selective mining and manual or automated sorting to produce a high-grade feed for the mill. Jaw crushers were used to reduce the size of the mill feed, and ball mills or roller mills were used to produce the final product. Fluid-energy mills or pulverizing mills were used for ultrafine grinding of the talc ore. In a few instances, the ore was calcined prior to milling to increase its whiteness.

Flotation processes were used when the desired product purity was not obtained by using conventional processing. The milled ore was chemically treated, passed through rougher and cleaner cells to separate the talc from the gangue material, dried in a flash dryer, and ground in a pulverizer. Ore composition, reagent type, pulp density, pH of the flotation system, and residence time in the flotation circuits determined flotation efficiency.

Cyprus Industrial Minerals Co. announced that it would close its Hammondsville mine. The decision to close the underground mine, which has operated for about 40 years, was made for safety and economic reasons.[4]

U.S. mine production of crude talc increased slightly in tonnage and 12% in value. Mines that operated in Montana, New York, Texas, and Vermont accounted for 96% of domestic talc production. Montana led all States in the tonnage and value of talc produced.

Pyrophyllite.—Pyrophyllite was produced by three companies operating four mines in two States. Production was from hydrothermally altered volcanic deposits of acidic composition. The deposits consisted of pyrophyllite with sericite, andalusite, and/or quartz as accessory minerals. After removing the overburden, the ore was either stripped using dozers and scrapers or extracted using conventional open pit mining techniques. The ore was dried, and then jaw crushers and gyratory crushers were used to reduce the size of the mill feed. Ball, pebble, or roller mills were used to produce the final product.

U.S. mine production of crude pyrophyllite increased slightly in tonnage. North Carolina accounted for most of the domestic production.

Consumption and Uses

Talc.—Talc was used in a wide variety of products because of its softness (1 on the Mohs scale), purity, fragrance retention, whiteness, luster, moisture content, oil and grease adsorption, chemical inertness, low electrical conductivity, high dielectric strength, and high thermal conductivity. These properties were not universal to all talcose materials because of differences in their mineralogical composition and particle shape. Mineral content was extremely important because it determined the end use for the material. Generally, only two or three of these properties were critical for any one application.

Talc was used as a filler in polypropylene compounds. It served to improve the modulus and impact strengths of the product, improve the stability of the

TABLE 2

CRUDE TALC AND PYROPHYLLITE PRODUCED IN THE UNITED STATES, BY STATE

(Thousand metric tons and thousand dollars)

State	1989		1990	
	Quantity	Value	Quantity	Value
Georgia (talc)	26	W	W	W
Montana (talc)	454	12,717	474	18,883
Texas (talc)	242	4,564	250	4,844
Other[1 2]	528	10,338	543	7,342
Total[2 3]	1,253	27,731	1,267	31,068

W Withheld to avoid disclosing company proprietary data; included in "Other."
[1] Includes Alabama, Arkansas, California, New York, North Carolina, Oregon, Vermont, and Virginia.
[2] Does not include value for pyrophyllite.
[3] Data may not add to totals because of independent rounding.

product under ultraviolet light, and reduce the price of the final product. Products had higher modulus and impact strengths, higher deflection temperatures under load, and lower coefficient of thermal expansion when finely ground talc was used with high crystallinity polypropylene.[5]

Domestic producers reported that overall sales (including direct exports) declined 4% in tonnage to 1,021,004 tons and 3% in value to $110,584,808 in 1990. The major consumer of talc was the construction industry, with applications in ceramic tiles and sanitaryware, joint compounds, paint, plastics, and roofing. The end-use distribution was ceramics, 28%; paint, 18%; paper, 16%; roofing, 11%; plastics, 6%; cosmetics, 4%; and insecticides, refractories, rubber, and other, 17%. The greatest decrease in demand was in ceramics, cosmetics, and plastics applications. Some decline was expected due to a sluggish U.S. economy, but it is doubtful that the entire decrease can be attributed to a sluggish economy. It is likely that some sales to the ceramic, cosmetic, and plastic industries were reported under the "Other" category, which increased in 1990. More than 90% of the companies responded to the end-use portion of the 1990 annual survey, representing approximately 95% of the data in table 3.

TABLE 3

END USES FOR GROUND TALC AND PYROPHYLLITE

(Thousand metric tons)

Use	1989			1990		
	Talc	Pyrophyllite	Total[1]	Talc	Pyrophyllite	Total[1]
Ceramics	308	70	377	235	W	235
Cosmetics[2]	50	—	50	36	—	36
Insecticides	—	11	11	6	W	6
Paint	143	—	143	155	W	155
Paper	138	5	143	143	—	143
Plastics	97	1	98	48	W	48
Refractories	1	21	21	3	W	3
Roofing	97	—	97	94	—	94
Rubber	20	[3]	21	20	W	20
Other[4]	100	10	109	109	W	109
Total[1]	953	[5]117	[5]1,070	849	[5]100	[5]849

W Withheld to avoid disclosing company proprietary data.
[1] Data may not add to totals shown because of independent rounding.
[2] Incomplete data. Some cosmetic talc known to be included in "Other."
[3] Less than 1/2 unit.
[4] Includes art sculpture, asphalt filler and coatings, crayons, floor tile, foundry facings, rice polishing, stucco, and other uses not specified.
[5] Includes imported pyrophyllite.

Pyrophyllite.—Pyrophyllite, being different in composition from talc, did not have the same applications as talc. Properties such as softness (1 to 2 on the Mohs scale), whiteness, chemical inertness, high melting point, low electrical conductivity, and high dielectric strength made pyrophyllitic materials useful for ceramics and refractories.

U.S. consumption of pyrophyllite increased slightly in tonnage in 1989. The largest portion of domestically produced ground pyrophyllite was used in ceramics, followed by refractories, insecticides, paint, plastics, and rubber. The end-use distribution did not change significantly from previous years.

Markets and Prices

Talc prices varied depending on the quality and on the degree and method of processing. The unit value of crude talc was $25 per ton. The average unit value of processed talc was $108 per ton. The average unit values of crude and processed pyrophyllite were higher in 1990 than in 1989. Unit values for imported crude and ground talc ranged from $33 per ton to $410 per ton for quantities greater than 100 tons. The average unit value for all imported talc was $170 per ton. Unit values for exported talc ranged from $16 per ton to $1,576 per ton for quantities greater than 100 tons and averaged $138 per ton for all exports.

Prices, quoted by the American Paint & Coatings Journal, December 26, 1990, in U.S. dollars per metric ton for paint-grade talc in carload lots ranged from $99 to $243. Approximate equivalents, in dollars per metric ton, of price ranges quoted in Industrial Minerals (London), December 1990, for talc, c.i.f. main European ports, ranged from $165 to $336.

Foreign Trade

Talc exports decreased 25% in tonnage and increased 14% in value. Mexico remained the largest importer of talc, followed by Canada, Japan, and Belgium-Luxembourg. Talc imports decreased 17% in tonnage and 9% in value. Australia and Canada provided 82% of all talc imports.

World Review

The United States remained the world's largest talc producer, and Japan remained the largest pyrophyllite producer. China, Japan, and the United States accounted for 43% of the world's talc and pyrophyllite production.

The production and consumption of

TABLE 4

PRICE OF TALC

(U.S. dollars per metric tons)

Canada: Fine micron, Hegman No. 6	226
Montana: Ultrafine grind, Hegman No. 6	243
New York:	
Nonfibrous, bags, mill:	
98% through 325 mesh	99
99.6% through 325 mesh	115
Trace retained on 325 mesh	182
Norwegian:	
Ground (ex store)	168–185
Micronized (ex store)	221–309
French, fine-ground	212–336
Italian, cosmetic-grade	309
Chinese, normal (ex store):	
UK 200 mesh	254
Uk 325 mesh	265
New York, paint, minimum 20-ton lot	165

Sources: American Paint & Coatings Journal, Dec. 26, 1990, Industrial Minerals (London), Dec. 1990.

TABLE 5

U.S. EXPORTS OF TALC[1]

(Thousand metric tons and thousand dollars)

Year	Belgium-Luxembourg		Canada[2]		Japan		Mexico		Other[3]		Total[4]	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1986	14	1,273	54	4,411	20	1,707	102	4,464	24	4,447	212	16,302
1987	27	2,482	55	5,000	24	2,405	101	4,182	47	5,538	255	19,607
1988	27	3,942	62	5,079	30	3,849	97	3,225	44	5,296	260	21,391
1989	30	4,766	81	5,614	35	4,710	107	6,601	65	7,258	319	28,949
1990	45	6,109	43	6,995	31	4,233	e82	e8,006	37	7,566	238	32,909

e Estimated.

[1] Excludes powders—talcum (in package), face, and compact.

[2] Probably includes shipments in transit through Canadian ports.

[3] Includes 39 countries in 1990.

[4] Data may not add to totals shown because of independent rounding.

Source: Bureau of the Census.

TABLE 6

U.S. IMPORTS FOR CONSUMPTION OF TALC, BY COUNTRY

Country	Not crushed or powdered		Crushed or powdered		Cut and sawed		Talc n.s.p.f.	Total unmanufactured[1]	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Value (thousands)	Quantity (metric tons)	Value (thousands)
1988:	31,988	$2,617	46,221	$7,679	1,182	$880	$1,090	79,391	$12,268
1989:									
Australia	6,999	500	6,001	540	—	—	NA	13,000	1,040
Brazil	—	—	228	40	116	57	NA	344	97
Canada	116	35	46,559	6,808	133	112	NA	46,808	6,964
China	5,080	366	576	157	748	540	NA	6,404	1,063
Italy	—	—	2,647	630	—	—	NA	2,647	630
Korea, Republic of	137	26	1,233	209	—	—	NA	1,370	235
Other[2]	4,084	533	2,871	891	188	695	NA	7,143	2,109
Total[1]	16,416	1,460	60,115	9,265	1,185	1,404	NA	77,716	12,128
1990:									
Australia	5,449	554	7,014	373	—	—	NA	12,463	927
Brazil	37	17	190	30	35	25	NA	262	72
Canada	76	12	39,665	5,880	895	857	NA	40,636	6,750
China	6,364	486	58	7	706	446	NA	7,128	939
Italy	2,625	677	7	6	—	—	NA	2,632	683
Korea, Republic of	—	—	527	122	—	—	NA	527	122
Other[3]	102	19	1,141	1,015	208	531	NA	1,451	1,564
Total[1]	16,652	1,765	48,602	7,432	1,844	1,859	NA	65,099	11,056

NA Not available.

[1] Data may not add to totals shown because of independent rounding.

[2] Includes 19 countries.

[3] Includes 24 countries.

Source: Bureau of the Census.

talc in Australia and East Asia was reviewed. The paper focussed on high-quality deposits in Australia, China, and the Republic of Korea, whose producers account for approximately one-third of the world's talc production. The region possesses large reserves, high-quality deposits, and a good location with regard to growing markets, although technological deficiencies and supply reliability are weaknesses of the industry.[6]

Capacity.—The data in table 6 are annual rated capacity for mines and refineries as of December 31, 1990. Rated capacity is defined as the maximum quantity of product that can be produced in a period of time on a normally sustainable long-term operating rate, based on the physical equipment of the plant, and given acceptable routine operating procedures involving labor, energy, materials, and maintenance. Capacity includes both operating plants and plants temporarily closed that, in the judgment of the author, can be brought into production within a short period of time with minimum capital expenditure.

Australia.—South Australia supplied most of the talc for Australia's domestic demands despite accounting for only 9% of Australia's total production. Production comes primarily from the Mount Fitton deposit, 470 miles north of Adelaide. The Mount Fitton deposit was formed through the hydrothermal alteration of dolomite and marble rocks. It is 10 to 15 meters wide, 20 meters high, and several hundred meters long. Conventional open pit methods are used to mine the deposit. Approximately 70% of production is used in pharmaceutical and paint products.[7]

Ireland.—Ivernia West PLC acquired a major shareholding in Talc Technology Ltd., owner of the Westport talc deposit. The talc deposit is composed of 50% talc, 33% breunerite, 10% antigorite, 2% dolomite, and 5% magnesite and contains approximately 5.5 million tons of talc. If development permits are approved, the mine production initially will be 40,000 tons per year.[8]

Sweden.—Handöls Taljstens AB, now under private ownership, produces approximately 20,000 tons of talc-chlorite for animal feed, roofing, plastics, and fertilizers. Research is being conducted to separate talc from chlorite through flotation processing. The processed talc will be suitable for paper applications. Primary tests indicate that the talc can be upgraded from 60% talc to 97% talc with a brightness of 92% to 93%.[9]

TABLE 7

WORLD TALC AND PYROPHYLLITE ANNUAL PRODUCTION CAPACITY, DECEMBER 31, 1990

(Thousand metric tons)

Country	Rated capacity[1]
North America:	
Canada	299
United States	1,361
Total	1,660
Latin America:	
Argentina	45
Brazil	454
Mexico	36
Other	36
Total	571
Europe:	
Austria	136
Finland	363
France	363
Italy	163
Norway	136
U.S.S.R.	544
Other	236
Total	1,941
Africa:	
Egypt	13
South Africa, Republic of	18
Other	1
Total	32
Asia:	
China	1,179
India	454
Iran	32
Japan	1,633
Korea, North	1
Korea, Republic of	998
Other	82
Total	4,378
Oceania:	
Australia	227
World total	8,809

[1]Includes capacities of operating plants as well as plants on standby basis.

Venezuela.—A talc deposit was discovered on Margarita Island, off the coast of Venezuela. Further investigations are being carried on the commercial viability of the deposit. Venezuela currently does not produce talc.[10]

Current Research

The flotation process can be better controlled with the use of on-line monitoring. On-line processing enables the operator to immediately detect changes in the operation and make the necessary adjustments to ensure a constant product quality. X-ray fluoresence is used to determine elemental compositions of the flotation slurry at various stages in the flotation process. Greater control is obtained when coupled with on-line brightness determinations.[11]

The use of column flotation to process industrial minerals was reviewed. The paper discussed the processing of andalusite, chromite ore, fluorite, graphite, manganese oxide ore, phosphate ore, potash, and talc. A talc ore composed of 50% talc and ground to 80% less than 45 micrometers was upgraded to 73% talc by using two stages of column flotation. This result is a 6% improvement over conventional flotation using five stages. A Korean talc ore composed of 73% talc and ground to less than 45 micrometers was upgraded to 83% by using a single stage of column flotation. Recovery of the same ore using three stages of conventional flotation was 45% to 65%.[12]

OUTLOOK

The average annual growth in domestic demand for talc and pyrophyllite was 1.2% between 1981 and 1990. Demand averaged between 900,000 and 1,000,000 tons per year for this period. Relative increases and decreases in demand have been the result of minor market fluctuations rather than long-term trends. Demand for talc and pyrophyllite is expected to continue to fluctuate around 1 million tons per year in the near future.

Ceramics will continue to be the major domestic end use for talc, followed by consumption in paint, paper, plastics, roofing, and cosmetics, in de-

scending order. For pyrophyllite, the major domestic end uses will continue to be in ceramics and refractories.

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TABLE 8

TALC AND PYROPHYLLITE: WORLD PRODUCTION, BY COUNTRY AND PRODUCT[1]

(Metric tons)

Country[2]	1986	1987	1988	1989	1990[e]
Argentina:					
Pyrophyllite	2,812	1,260	671	r1,310	1,300
Steatite[e]	300	300	250	250	250
Talc	22,353	27,103	r26,108	r26,658	26,000
Australia:					
Pyrophyllite	8,588	6,036	5,750	r5,000	5,000
Talc	179,467	206,865	199,631	r195,000	200,000
Austria: Steatite	133,319	129,959	132,974	r133,078	130,000
Brazil:[3]					
Agalmatolite	131,036	104,536	r122,531	r120,000	120,000
Pyrophyllite	87,250	51,114	r60,070	r162,000	170,000
Talc	r349,528	425,513	r378,463	r433,000	430,000
Burma: Steatite	56	22	r25	r r20	20
Canada (shipments): Pyrophyllite, soapstone, talc	123,037	r136,418	r146,489	r146,000	146,000
Chile: Talc	2,257	980	1,070	r835	1,000
China: Unspecified[e]	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Colombia: Pyrophyllite, soapstone, talc	9,013	11,927	12,800	r9,196	10,000
Egypt: Pyropyllite, talc, soapstone, steatite	8,800	r6,600	7,268	r7,146	7,000
Finland: Talc	284,179	319,000	379,000	r380,000	380,000
France: Talc	r324,660	r328,800	r r320,000	r329,960	330,000
Germany, Federal Republic of:					
Western states: Talc (marketable)	21,884	19,785	r19,500	r13,000	15,000
Greece: Steatite	17,310	1,507	r1,600	r10,518	10,000
Hungary: Talc[e]	16,000	15,000	13,000	12,000	12,000
India:					
Pyrophyllite	r58,884	51,724	r64,923	r97,264	95,000
Steatite	r378,683	359,448	r417,493	r414,268	416,000
Iran: Talc[e]	31,000	31,000	31,000	30,000	30,000
Italy: Steatite and talc	151,206	150,718	158,722	r146,000	145,000
Japan:					
Pyrophyllite	1,270,112	1,241,069	1,244,491	r1,233,600	[4]1,231,195
Talc	63,851	55,899	r49,797	r55,665	[4]61,550
Korea, North: Unspecified[e]	170,000	170,000	170,000	170,000	170,000
Korea, Republic of:					
Pyrophyllite	587,049	690,819	673,776	r770,298	750,000
Talc	210,631	161,052	146,478	r162,098	160,000
Mexico: Talc	24,301	17,469	r13,645	r13,908	13,800
Nepal: Talc[5]	8,780	r3,359	4,430	r6,728	6,500
Norway: Talc[e]	100,000	100,000	100,000	100,000	100,000
Pakistan: Pyrophyllite	23,021	23,278	37,429	r38,290	40,000
Paraguay: Unspecified	130	180	150	200	200
Peru:					
Pyrophyllite	7,354	705	r1,000	r750	750
Talc	1,754	1,447	r1,500	r1,250	1,300
Philippines: Talc	r1,000	—	r27	—	—

See footnotes at end of table.

TABLE 8—Continued

TALC AND PYROPHYLLITE: WORLD PRODUCTION, BY COUNTRY AND PRODUCT[1]

(Metric tons)

Country[2]	1986	1987	1988	1989	1990[e]
Portugal: Talc	r5,908	7,292	7,187	r8,063	[4]7,926
Romania: Talc[e]	65,000	65,000	65,000	60,000	55,000
South Africa, Republic of:					
Pyrophyllite	4,606	3,467	3,162	r3,942	[4]2,759
Talc	8,641	8,005	10,111	r11,596	[4]11,179
Spain: Steatite	r73,914	75,307	r68,979	re75,000	75,000
Sweden: Talc and steatite	11,233	16,981	e16,000	e16,000	16,000
Taiwan: Talc	21,552	22,102	21,603	r22,559	22,000
Thailand:					
Pyrophyllite	36,165	37,749	37,285	r39,799	39,000
Talc	2,886	4,101	4,843	r7,242	7,200
U.S.S.R.: Talc[e]	520,000	530,000	530,000	530,000	500,000
United Kingdom: Talc	12,352	12,529	14,182	r15,413	15,000
United States:					
Pyrophyllite	75,000	83,000	97,000	81,301	[4]82,025
Talc	1,106,000	1,080,000	r1,136,347	1,171,871	[4]1,185,142
Uruguay: Talc	1,255	1,648	e1,600	e1,600	16,000
Zambia: Talc	266	258	73	r114	200
Zimbabwe: Talc	797	516	976	r1,513	1,500
Total	r7,755,180	r7,798,847	r7,956,409	r8,271,303	8,250,796
Of which:					
Pyrophyllite	2,160,841	2,190,221	2,225,557	2,433,554	2,417,029
Steatite	603,582	566,543	621,321	633,134	631,270
Talc	3,386,302	3,444,723	3,475,571	3,590,073	3,588,297
Unspecified	1,604,455	1,597,360	1,633,960	1,614,542	1,614,200

[e]Estimated. [r]Revised.

[1]Table includes data available through May 14, 1991.

[2]In addition to the countries listed, Czechoslovakia and Turkey produce talc, but information is inadequate to make reliable estimates of output levels.

[3]Total of beneficiated production, salable direct shipping production, and that consumed by producers.

[4]Reported figure.

[5]Data based on Nepalese fiscal year beginning mid-July of year stated.

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